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EClinicalMedicine

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## Are respiratory rate counters really so bad? Throwing the baby out with the bath water

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### ARTICLE INFO

#### Article history:

Received 16 July 2019

Accepted 23 September 2019

Available online xxx

We congratulate Baker et al. [1] on their bold attempt to evaluate respiratory rate counters. However, their data show significant variability and wide limits of agreement with all devices which are much greater than reported in previous studies. The gross errors (>30 breaths/minute) are much more likely due to artifacts in the reference capnometer device or the lack of breath identification by the observer than test device performance.

We strongly support the use of capnography as a reference device for respiratory rate measurement. However, this invasive procedure introduces many additional risks. The difficulty of using capnography in awake children is reflected in the fact that one quarter of observations were withdrawn [1]. Capnometers measure respiratory rate by detecting the presence of exhaled carbon dioxide (CO<sub>2</sub>) in each breath [2]. The magnitude, regularity and shape of the CO<sub>2</sub> waveform must be used to confirm the rate [3]. This is especially important in small children with rapid breathing rates and small tidal volumes which result in dilution of the end tidal gas. Expert observer counting and analysis of sequential observations from each observer should help in identifying the cause of these gross errors.

The inability to identify a breath should be considered less a failure of the device and more of the observer.

The clinical measurement of respiratory rate is widely used in clinical diagnosis in children. Until the performance of automated counters have been established, the use of respiratory rate counters should not be discarded based on this study alone.

#### Declaration of Competing Interest

The authors are the inventors of the RRate app, that has been evaluated by Baker et al.

#### References

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<https://doi.org/10.1016/j.eclinm.2019.09.013>

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